Health & Safety Manual

Supplement 2.30

Decontamination and Disposition of Process-Contaminated Facilities and Associated Equipment

Approved by the ES&H Working Group

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*** Major revision**

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and Associated Equipment

1.0 Introduction

1.1 Purpose and Scope

This supplement provides Directorates requirements and guidelines for maintaining records that will contain information when decontamination and disposition (D&D) work is to be done on process-contaminated facilities and associated equipment. The purpose of these records is to reduce the amount of sampling and characterization of equipment and facilities prior to D&D. The supplement also describes the D&D work planning process, procedures for handling process-contaminated facilities (or parts thereof) and equipment, and the responsibilities of individuals assigned to perform D&D work in process-contaminated facilities and on associated equipment.

For purposes of this supplement, the term “process contamination” is defined as contamination (radioactive, chemical, explosive, or biological) that has occurred because of project activities. “Decontamination and disposition” is the process of removing contamination from project facilities and associated equipment for reuse or salvage or disposing of contaminated facilities that cannot be successfully decontaminated for reuse. The term “facility” refers to either a facility or part of a facility. Other terms and definitions can be found in Appendix A.

Previous versions of this supplement specifically covered the D&D of radioactively contaminated facilities and associated equipment. This version was revised to include up-to-date DOE requirements governing D&D work and to address a broader range of contaminants.

1.2 Background

The Department of Energy (DOE) has retained responsibility for performing D&D work on process-contaminated facilities through the Cognizant Secretarial Offices (CSOs). This responsibility includes the transfer of large D&D projects to the Environmental Restoration and Waste Management (EM) Office.

There are four mechanisms for funding D&D work; DOE uses the first three and the Laboratory uses the fourth:

1. The CSO can directly fund the D&D plan and work.
2. EM can provide funding for the Laboratory to prepare the plan and carry out the work.
3. EM can prepare the plan, with input from the Laboratory, and contract for the work directly.
4. The Laboratory may undertake small D&D projects on its own initiative. For example, a Facility Associate Director (AD) may decide to perform the work using resources (usually from operating funds) available to the Laboratory.

More details on funding and administrative issues can be found in *Funding and Plans for Decontamination Projects,* which can be obtained from your AD Facility Manager.

2.0 Applicability

The requirements and guidelines in this supplement apply to process-contaminated facilities (or parts thereof) and associated equipment. These shall be applied using a graded approach based on the type and extent of contamination identified within the facility. The Environmental, Safety, and Health (ES&H) Teams can provide clearance levels of various substances that will help in determining whether or not a facility or piece of equipment is process contaminated.

3.0 Requirements/Regulatory Summary

The guidance in this supplement is based on applicable federal, state, and local regulations; LLNL ES&H policies and procedures; recent experience at other DOE sites; and the DOE Orders specified in Section 6.2.

4.0 Project Planning for Decontamination and Disposition of Facilities and Equipment

This section contains requirements and recommended procedures for carrying out D&D on process-contaminated facilities and associated equipment.

4.1 Documentation Required

4.1.1 Contamination File

A contamination file is required for all process-contaminated facilities and equipment. For a radioactively process-contaminated facility, the file shall contain the type, location, and level of contamination found within the facility or on associated equipment. It also may contain or reference operational records, operational safety procedures (OSPs) or facility safety procedures (FSPs), Occurrence Reports, Incident Analysis Reports, spill reports, notes, drawings, key plans, characterization reports, and other similar documents associated with the facility. The ChemTrack database may contain useful information for the file. For non-radioactively contaminated facilities, the requirements for a file can be met by using existing records such as those described in this subsection.

The Facility AD determines the form, content, and who (e.g., Facility Manager) will maintain contamination files.

4.1.2 Contamination Summary

A Contamination Summary briefly outlines the current condition of a facility. It is usually required when a process-contaminated facility is transferred from one directorate to another, placed in a surveillance and maintenance mode, or analyzed for D&D. Appendix B provides specific guidance for preparing a Contamination Summary.

4.1.3 Implementation Plan

An Implementation Plan is required before beginning D&D work. The format of the plan for internally funded D&D projects may be specified by the Facility AD. (Appendix C of this supplement and Chapter 2 and Supplement 2.02 of the *Health & Safety Manual* contain detailed information on preparing the plan.) The format, guidelines, and responsibility for the plan for externally funded projects are determined by the DOE funding source.

4.2 D&D Work Planning Process

4.2.1 D&D Factors to Consider

The level of D&D effort required for process-contaminated facilities and equipment depends on factors such as

- The types and amount of contaminants.
- The physical and chemical forms of contaminants.
- The types of activities conducted in the facility (e.g., chemical processing, waste management, handling of fine powders and material in solid form, and the use of corrosive materials or unencapsulated radioactive materials).

- The extent of contamination in engineered confinement systems, including hoods, glove boxes, stacks, filters, ventilation ducting, piping, and retention tanks.
- Spills, releases, or fires that may have caused contaminants to disperse outside normal confinement structures or created hazardous or mixed wastes.
- The incorporation or distribution of fixed radioactive or hazardous materials in facility structures (e.g., fixed-surface contamination covered with paint, or activation of containment vessels or shielding).
- The size and age of the facility, construction of the facility, types of material contaminated (e.g., asphalt, concrete, stainless steel, rubber, plastic), and number of rooms in the facility.
- Availability of records or of knowledgeable personnel who have worked in the facility.
- The amount of equipment that will be subject to the D&D effort.
- The volume and characteristics of the D&D waste generated.
- Potential personnel hazards (high-radiation fields or very high levels of contamination) that may be encountered during the D&D effort.
- The presence of other-than-process-contaminated hazardous materials (lead, PCBs, or asbestos) that would complicate the D&D effort.
- Use of the facility for permitted management of hazardous or mixed waste.
- Disposal options and certification for disposal of low-level waste generated during D&D activities.

The D&D effort for a specific facility can range from a relatively simple task to a very complex operation based on the D&D factors described above. For example, more costly and complicated D&D efforts will require comprehensive Implementation Plans. Consider the following examples:

1. A facility that contains only a few laboratories where small quantities of radionuclide, chemical, or biological materials are used on bench tops and/or in hoods may require a relatively simple Implementation Plan and other project planning documents (e.g., a contamination file detailing any permanent contamination and its location for the operational life of the facility.) The contamination file is reviewed and updated, then a Contamination Summary is prepared. If D&D is deferred, and the facility will no longer be used, a Surveillance and Maintenance Plan will be developed in accordance with Supplement 2.10 of the *Health & Safety Manual*. If D&D is to proceed, it may either be funded in-house or externally. *Funding and Plans for Decontamination Projects*, which can be obtained from the AD Facility Manager, contains details on obtaining funding for D&D activities.
2. A facility that uses many separate laboratories to handle high levels of transuranic radionuclides, explosives, or carcinogens would require a

more comprehensive Implementation Plan and other planning documents. Operations involving these materials usually require the use of highly contaminated glove boxes, ventilation ducting, high-efficiency particulate air (HEPA) filtration systems, piping, and liquid waste and retention systems to prevent contaminants from escaping.

3. Process-contaminated equipment, which may be in an otherwise non-contaminated facility, would only be required to be labeled or tagged with the contaminant.

4.2.2 D&D Planning Stages

D&D planning involves three stages:

1. **Reviewing the condition of the facility.** This involves evaluating available files, records, and other sources. These files are used to prepare the Contamination Summary, which outlines the current condition of the facility. Many of the D&D factors for a facility can be found in approved Safety Analysis Reports (SARs) and FSPs.
2. **Preparing the necessary ES&H review documents**, such as those required by the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA).
3. **Preparing an Implementation Plan.** When a decision is made to proceed with D&D, an Implementation Plan shall be developed describing the D&D work, the budget, schedules, provisions for ES&H analyses, and required documentation (e.g., permits). D&D work must be done in accordance with ES&H policies; requirements in the *Health & Safety Manual* and *Environmental Compliance Manual;* medical surveillance requirements specified by Health Services; and applicable DOE Orders and federal, state, and local regulations.

The ES&H Teams have important roles in the planning and implementation of D&D work. Thus, the Facility AD shall consult with the area ES&H Team as early as possible during the planning phase for assistance with obtaining safety and NEPA documentation, including permits, and making the necessary arrangements for waste generation, storage, treatment, and disposal.

4.3 Procedures for Handling D&D Contaminated Facilities and Equipment

Acceptable contamination levels for the unrestricted release (see Appendix A for definition) of process-contaminated facilities and equipment can be determined by the area ES&H Team. A facility or equipment may be released to another directorate under restricted conditions if the contamination is reduced to an-agreed-upon level. Residual contamination levels, records, and verification criteria shall be established and approved by the Facility AD.

Process-contaminated facilities scheduled for D&D shall be evaluated for the presence of hazardous construction materials such as asbestos, lead, and polychlorinated biphenyl (PCB). These materials must be managed appropriately during D&D activities in accordance with procedures in the *Health & Safety Manual.* Additional guidance and information can be obtained from the area ES&H Team.

5.0 Responsibilities

This section describes the responsibilities of Facility and Program ADs, Environmental Protection Department, and Hazards Control Department for planning D&D work.

5.1 Facility ADs

Facility ADs have primary responsibility for maintaining records, collecting information for D&D planning, and monitoring the condition of process-contaminated facilities. (The Facility AD Report, issued by Space and Site Planning, lists the current facilities assigned to each AD.) Facility ADs are also responsible for

- Preparing and maintaining contamination files on all existing process-contaminated facilities covered by this supplement. This includes
  - — Maintaining existing operational records that will facilitate D&D activities and help in the reduction of radioactive, hazardous, and mixed waste generated during D&D activities. Operational records may include facility design drawings and modification records, reports containing characterization data on contamination levels and prior decontamination activities, and occurrence and incident reports.
  - — Updating contamination files whenever a significant change affects process-contaminated facilities and associated equipment.
- Planning D&D activities. This includes
  - — Preparing a Contamination Summary, as described in Appendix B, whenever a process-contaminated facility or an area containing process-contaminated equipment is to be vacated.
  - — Establishing a surveillance and maintenance program in accordance with the requirements in Chapter 33 and Supplement 2.10 of the *Health & Safety Manual* and National Emission Standards for Hazardous Air Pollutants (NESHAP).
  - — Consulting the area ES&H Team (and any other Program AD involved) when planning D&D activities for guidance on minimizing the generation of radioactive, hazardous, and mixed wastes and protecting workers, the public, and the environment.

  - — Establishing and implementing an ES&H review process for obtaining the necessary permits and ensuring regulatory compliance.
  - — Preparing estimates for the sampling and characterization of contaminated areas.
  - — Preparing estimates for projected waste-generation activities associated with the D&D effort.
  - — Estimating the amount and types of materials proposed for reuse or recycling.
- Obtaining guidance from the Environmental Protection Department on developing a strategy for meeting long lead-time regulatory requirements.

The handling and storage of hazardous, radioactive, and mixed waste are major concerns of the Laboratory. Therefore, the Facility AD must make every effort technically and economically feasible to

- Reduce the amount of waste generated.
- Have low-level radioactive waste streams certified.
- Secure adequate waste storage.
- Establish disposal options.

5.2 Program ADs

A Program AD who conducts process-contaminating operations in the facility of another AD shall

- Provide that Facility AD with the necessary data to be included in his/her contamination files during and upon completion of operations.
- Deactivate areas involved in the operations and, if appropriate, prepare a Shutdown, Surveillance, and Maintenance Plan in accordance with the guidance in Supplement 2.10.
- Assist in preparing (or prepare) a Contamination Summary for areas vacated.

5.3 Environmental Protection Department

Personnel in the Environmental Protection Department have expertise in

- Handling, packaging, and processing radioactive, chemical, explosive, biological, hazardous, and mixed waste.
- Interpreting and implementing NHPA and NEPA requirements and other federal, state, and local regulations.
- Preparing waste-handling documentation.
- Obtaining regulatory permits.
- Assisting with pollution prevention activities.

When D&D Plans are to be developed, the Environmental Protection Department shall

- Identify regulatory and permit requirements for D&D activities with the Facility and Program ADs to ensure compliance with these requirements.
- Prepare the necessary environmental review documents (permit applications, closure plans, and reports). If environmental permits are required for any phase of D&D, the conditions of the permits shall be negotiated with the regulatory agencies involved.
- Assist in preparing sampling plans, conducting sampling, and determining analytical requirements.
- Evaluate sampling data, characterize waste for disposal, and identify waste disposal options for waste generated from D&D activities.
- Work with the Facility AD to develop a waste certification procedure for the disposal or treatment of waste in the D&D waste streams.
- Recommend that waste handling, packaging, and processing procedures be included in Implementation Plans.

5.4 Hazards Control Department

In support of the D&D effort, Hazards Control shall provide the following to programs:

- Assistance in identifying potential hazards and the appropriate controls to reduce the risk to workers who perform D&D work.
- Assistance in developing required safety documentation (e.g., Implementation Plans and OSPs).
- Guidance on characterizing contaminated facilities or equipment, evaluating the potential hazards associated with the characterization and implementation phases of the D&D process, and specifying the appropriate safety controls.
- Surveillance and monitoring of activities during each phase of the D&D process.
- Copies of FSPs, OSPs, and other records that may be helpful in preparing the Contamination Summary and Implementation Plan.
- Clearance levels for restricted or unrestricted release of equipment.

5.5 Health Services Department

Health Services shall provide medical surveillance programs for LLNL employees who perform D&D work.

5.6 Plant Engineering

Plant Engineering maintains design, modification, and as-built drawings of buildings and plant-in-place data.

6.0 Additional Information

6.1 LLNL Contacts

For further information regarding D&D work, contact the following:

- Directorate Assurance or Facility Managers.
- ES&H Teams. The teams will coordinate direct field support from Hazards Control and the Environmental Protection Department.

6.2 References and Supporting Information

Code of Federal Regulation, Title 29, Part 1910.1020, "Employee Access to Medical Records."

DOE Order DOE 5820.2A, Chapter V, "Decommissioning of Radioactively Contaminated Facilities."

DOE Order DOE 5400.5, Chapter II, Section 5, "Release of Property Having Residual Radioactive Material."

DOE Order DOE 5480.10, "Contractor Industrial Hygiene Program."

Funding and Plans for Decontamination Projects. (A copy of this document can be obtained from the AD Facility Manager.)

Health & Safety Manual, Supplement 2.10, "Guidelines for the Shutdown or Transfer of Operations or Facilities."

Policy and Procedure for the Disposition of Space. (A copy of this document can be obtained from the AD Facility Manager.)

Appendix A

Terms and Definitions

contamination files	A generic term used in this supplement to encompass the various types and forms of contamination information for a facility. Contamination files may contain or reference operational records pertinent to process contamination, OSPs or FSPs, Occurrence Reports, Incident Analysis Reports, spill reports, notes, drawings, key plans, and any other information that would locate and identify contamination in the facility. The form, style, and size of the files, as well as where the files are to be stored, are not specified.
contamination summary	A one- or two-page document outlining the current condition of a contaminated facility. Appendix B contains guidance for preparing a Contamination Summary.
decontamination	Removal of process contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.
disposition	The act or power of disposing or making final arrangements, or, for purposes of this supplement, the process of deciding what to do with the facility. Possible outcomes might be demolition, reuse, or transfer.
facility	A facility or group of facilities (e.g., facility complex) specified in the Facility AD Report issued by Space & Site Planning, or a laboratory or group of laboratories dedicated to a specific operation.
hazardous waste	Wastes determined to be hazardous by the Federal Resource Conservation and Recovery Act (RCRA) or by the State of California.
implementation plan	A plan that describes the actual work to be performed in a facility and methods for complying with DOE and other ES&H regulations governing waste handling. This plan should be based on an evaluation of all contamination sources identified within the facility. It also shall include data from the contamination files and detailed budgets and schedules.

mixed waste	Waste containing both radioactive and hazardous components, as defined by the Atomic Energy Act and the RCRA.
operation	A program, series of experiments, or function dedicated to a specific mission.
pollution prevention	Materials, processes, and practices used to reduce or eliminate the generation or release of pollutants, contaminants, hazardous substances, and waste into land, water, and air.
process contamination	A facility (and equipment) that has been contaminated by the processes conducted therein. This includes radioactive, chemical, explosive, and/or biological contamination. This term is limited to materials and quantities declared to be hazardous by federal, state, and DOE regulations. It does not include materials used in the construction of the facility (e.g., the use of asbestos, lead, PCB-containing oils, or similar materials) or background constituents that are indigenous. The determination of process contamination is highly variable and will often require an evaluation by subject-matter experts. Factors to be considered in this determination may include 1. The type of material and amount of contamination. Certain combinations of contamination may also be considered in determining whether or not a facility is process contaminated. 2. The location of contamination in the facility. For instance, contaminated air-conditioning ducts might qualify as contaminated equipment, but the facility may not be classified as contaminated. 3. The intended use of the facility. For instance, if a chemistry laboratory in which minor, routine spills occur will continue to be used for its intended purpose, it might not be considered to be contaminated. If, however, the facility will be converted into an office, then it would be considered to be process-contaminated because different regulations would apply to its new intended use.

radioactive waste	Solid, liquid, or gaseous materials containing radionuclides that are regulated under the Atomic Energy Act of 1954, as amended, and of negligible economic value considering the costs of recovery.
recycle	The process of reusing or reclaiming a material.
restricted release	The release of a contaminated facility or equipment with restrictions to another Laboratory organization. This organization is then responsible for maintaining administrative and technical controls for the facility or equipment and for ensuring the protection of employees and the public. This type of facility or equipment shall not be released to the general public.
unrestricted release	The release of a (formerly contaminated) facility or equipment that meets the release requirements specified in DOE orders and state and federal law. (The ES&H Team can provide assistance with release criteria.) This type of facility or equipment may be released to the general public.

Appendix B

Guidelines for Preparing A Contamination Summary

A Contamination Summary is a brief document that outlines the current condition of a facility. (The term "facility" refers to the facility or building for which the summary is being prepared.) It is usually required when a facility is transferred from one AD to another, when there is no longer a use for the facility, or when a D&D activity is being planned. A Contamination Summary may deviate from the format specified in this appendix. However, it shall be developed using a graded approach and include (or reference) all the information requested for the functional areas listed.

I. Introduction

A. Summary date. List the month, day, and year.

B. Assigned line responsibilities (including those of ADs) for the facility and equipment. List or attach the organizational chart with names and titles.

II. General Facility Information

A. Facility Name. State the name assigned to a specific structure under a contiguous roof or other property (e.g., U-AVLIS, Plutonium Facility). Include closely related storage yards, waste accumulation areas, or similar areas and structures that would be included in the D&D effort.

B. Facility Number. List the assigned identification number of the facility (e.g., B332).

C. History and Use ofFacility. Briefly summarize how the facility has been historically used (i.e., its mission) in about one or two paragraphs.

D. Facility Special Features. Identify special features that could affect D&Dof the facility.

E. Overview of Facility Contamination and Materials. Briefly summarize the contamination status of the facility. Specify the primary contaminated areas, the types of contamination, and the level of contamination. Include chemicals, carcinogens, explosives, radioactive materials, and biohazards. List structural materials (e.g., asbestos or other hazardous materials) that would complicate the D&D effort.

F. Floor Plans Attach floor plans (available from Plant Engineering) detailing the facility layout. Contaminated areas of the facility may be marked on the floor plans (optional).

III. Facility Data (reference FSPs or other documents)

A. Active Confinement Required. State whether active confinement is required (HEPA filtration of exhaust air, maintenance of differential atmospheric pressures, temperature control, etc.).

B. Confinement Integrity Status. Assess the integrity of the facility confinement systems and categorize it as excellent, average, or poor. Consider factors such as the adequacy of integrity design to meet today's requirements and the degree to which the confinement system meets its original specifications.

C. Percent of Gross Facility Contaminated. Estimate the percentage of the total floor area within the facility that is contaminated. More detail may be required if DOE-EM is to be involved.

Appendix C

Guidelines for Preparing D&D Implementation Plans

An Implementation Plan is required before beginning D&D work. The Department of Energy (DOE) Environmental Restoration and Waste Management (EM) Office will prepare the plan for work it manages or conducts. LLNL will develop the plan using the guidelines in this appendix for work funded by DOE-EM or CSO and managed or conducted by LLNL. The format of the plan for D&D work is specified by the funding source. The format of the plan for D&D operations funded by LLNL is specified by the Facility AD. (The Facility AD for the facility is responsible for the actions specified in this appendix.)

For purposes of this document, it is assumed that (1) DOE has provided funds to prepare the Implementation Plan based on estimates given in the Funding Plan, and (2) funding will be provided in stages for large, complicated projects because the cost estimates are likely to change as new data are developed. (A copy of *Funding and Plans for Decontamination Projects* can be obtained form the AD Facility Manager.) Note that the Implementation Plan for large, complicated projects may require several iterations as detailed information becomes available. This approach presents the most extensive planning process. Simpler projects would require fewer iterations using a graded approach.

C.1 Characterization Phase

1. Describe in detail the sampling plan to be used to characterize the contaminated facility. Include a detailed cost and schedule estimate for obtaining the samples, performing the sample analysis, and reviewing the results. NOTE: It is possible that the first phase of characterization may indicate that additional samples will have to be collected and analyzed before work can proceed.
2. Request funding for the work described in this section.
3. If required, prepare a safety procedure consistent with the guidance in Chapter 2 of the *Health & Safety Manual.*
4. Prepare a level-of-effort estimate of the cost, then schedule the D&D effort based on the characterization data obtained from step 1.
5. Request funding for the “Planning Phase” (see Section C.2).

C.2 Planning Phase

1. Describe any sampling that will be required during the D&D process.
2. Describe in detail the processes required to accomplish D&D of the facility based on the characterization data obtained from Section C.1 and the contamination files.
3. Describe in detail the processes required for evaluating sampling data, characterizing waste, and identifying waste disposal options for wastes generated during D&D activities.
4. Outline any research or new techniques for handling unusual situations that might have been revealed in the characterization data.
5. Develop a detailed project plan with cost estimates, schedule, and milestones for the work described in step 2. The management of radioactive or mixed waste debris, equipment, and environmental media (soil, ground water) can be major cost factors that must be included in cost estimates. Prepare design reviews and justifications for the estimates.
6. Negotiate the details and estimates for the work with DOE.
7. Request funding for the D&D work in Section C.3.

C.3 D&D Execution Phase

1. If required, prepare a safety procedure consistent with the guidance in Chapter 2 of the *Health & Safety Manual.*
2. Perform the D&D work outlined in the Implementation Plan.
3. Conduct post-D&D sampling to verify that clearance criteria have been met.
4. Prepare a final D&D report describing the steps used, costs, schedule, and the post-D&D condition of the facility.

NOTE: It is possible that all phases will have to be repeated if additional contamination or undocumented facility features are uncovered during the execution phase. This may require negotiations of new budgets and schedules.